

Aerogel Insulation for the Thermal Protection of Venus Spacecraft, Phase II

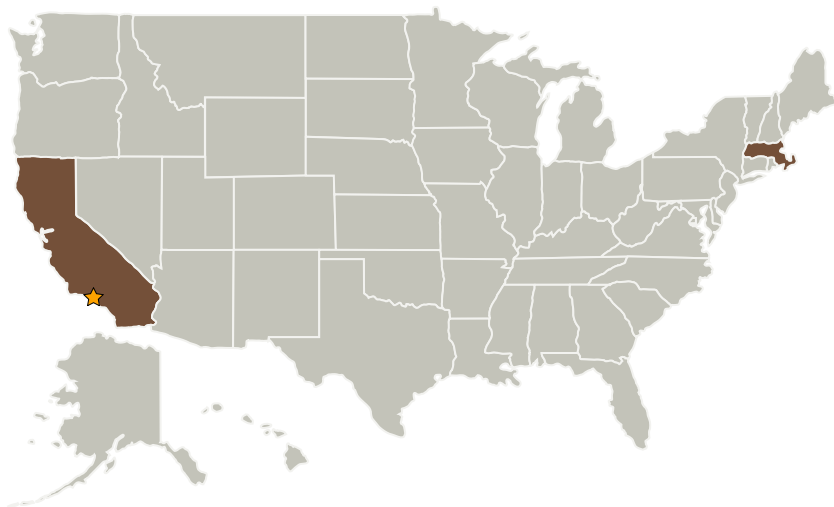
Completed Technology Project (2006 - 2009)



Project Introduction

One of NASA's primary goals for the next decade is the design, development and launch of a spacecraft aimed at the in-situ exploration of the deep atmosphere and surface of Venus. The success of this mission, called VISE (Venus In-Situ Explorer), is reliant on the development of effective thermal insulation solutions capable of protecting spacecraft for extended periods of time from the extreme heat and pressure associated with the lower atmosphere of Venus. Materials intended for exterior application must also be inert towards the sulfuric, hydrochloric and hydrofluoric acid present. Aspen Aerogels, Inc. proposes to continue its development of aerogel composites intended for thermal and chemical protection to a Venus spacecraft. During the Phase I program, we fabricated several aerogels with inherent thermal conductivities below 40 mW/m-K. In Phase II, we propose to optimize the synthesis through systematic changes in gelation, extraction, and pyrolysis conditions. Furthermore, we will demonstrate thermal conductivities of 100 mW/m-K at 500 C under 90 bars of CO₂ pressure. Lastly, methods for fabricating aerogel composites into complex shapes will be investigated along with system level design including attachment to the Venus spacecraft.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Aspen Aerogels, Inc.	Supporting Organization	Industry	Northborough, Massachusetts

Primary U.S. Work Locations	
California	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.2 Thermal Control Components and Systems
 - └ TX14.2.4 Insulation and Interfaces